THURSDAY, DECEMBER 6, 1888.

PRJEVALSKY'S FOURTH JOURNEY TO CENTRAL ASIA.

From Kiakhta to the Sources of the Yellow River, the Exploration of the Northern Borders of Tibet, and the Journey viâ *the Lob-nor and the Basin of the Tarim.* By N. M. Prjevalsky. (In Russian.) With 3 Maps, 29 Phototypes, and 3 Woodcuts. (St. Petersburg: Published by the Russian Geographical Society, 1888.)

IN this large quarto volume, which the indefatigable traveller brought out before leaving St. Petersburg for his proposed fifth journey to Central Asia, we have a general account of the journey he began at Kiakhta on November 20, 1883, and ended two years later at Lake Issyk-kul, in Russian Turkestan, after having visited the upper parts of both the Yellow and the Blue Rivers. As to the purely scientific description of the invaluable collections which were brought in by the Expedition, it has been undertaken by specialists and will be published separately.

Prjevalsky's aim during his fourth journey was to reach Lhassa, in Tibet; and it was in the hope that he might more easily make his way to that city that he started from Kiakhta, instead of taking the shorter route *viâ* Turkestan. His plan was to be at Lake Kuku-nor early in the spring; to buy provisions there, and to have them stored somewhere in South Tsaidam; and thence to proceed southwards, and to cross the north-eastern border-ridges of Tibet. The third part of the scheme could not be accomplished; and, after having visited the Upper Hoang-ho and the Upper Yang-tzse-Kiang (the Dy-tchu), Prjevalsky was compelled to return to his store-house, and thence he proceeded home *viâ* Lob-nor and East Turkestan. But the Expedition has thrown so much light upon the orography, the flora, the fauna, and the inhabitants of the outer terraces of Tibet, as well as of Eastern Turkestan, that one can hardly regret that the Russian traveller did not succeed in crossing the highlands to the north of the holy city of Buddhism.

The chapters devoted to the journey to the west of Kuku-nor will certainly be the first to attract the geographer, for only very brief accounts of that part of Prjevalsky's journey have hitherto been published. But the physical geographer and naturalist will also read with interest the pages devoted to the winter journey across the Gobi, to its terrible sand-storms, and the geological work of these storms, and still more the remarks upon the flora and fauna of the Nian-shan plateaus and the spring migrations of birds about Kuku-nor. It was in the Nian-shan that a new species of antelope, the *A. cuvieri*, was discovered. As seen from the drawing given by Prjevalsky, it differs widely from the next kindred species, the *A. gutturosa*.

It was only on May 13, 1884, that the Expedition reached the spot, Dzun-zasak, in South Tsaidam, where a store-house had to be erected. After having overcome considerable difficulties in getting camels and provisions, it started southwards in order to reach Lhassa. It crossed, first, the Burkhan-buda ridge, which rises like a wall from 7000 to 7500 feet high over the plateau of Tsaidam, and reaches the height of nearly 17,000 feet, without, however, attaining the limits of perennial snow. The Burkhan-buda is a border-ridge; it fringes the next and higher terrace of Northern Tibet, the lowest parts of which are from 3000 to 4000 feet higher than the Tsaidam plateau; and therefore it has but a gentle and short slope towards the south. At its southern foot, Prjevalsky found a broad valley, 13,400 feet above the sea, where flocks of wild *yaks* (*Poëphagus mutus*, a new species discovered by Prjevalsky) and *kuku-yamans* (*Pseudois nahoor*) live on the few grazing-grounds which can be found at such a height. A low range of hills separates this valley from the broad depression of Garmatyn, or Odon-tala, where the Expedition reached, on May 29, the upper part of the Hoang-ho and its two lakes, Jirin and Orin, so well known from Chinese sources, but never before visited by a European. "Now we saw the birth-place of the great river, we drank its water, and there were no bounds to our rejoicing," wrote the traveller in his note-book. He tried, of course, to explore the lakes, but a terrible snowstorm overtook the exploring party. Next day the ground was covered with two feet of snow, and the thermometer showed a frost of – 23° C., on June 1, under the 35th degree of latitude! The difficulty of moving on camels under such conditions may be easily imagined. But hunting was excellent, and Prjevalsky's companions killed numbers of the Tibetan bear (*Ursus lagomyiarius*). Alpine meadows, 16,000 feet above the sea, spread towards the south, but high mountain-ridges separate them from the Dy-tchu (the Upper Yang-tzse-Kiang), and it was only on June 22 that the party reached the Dy-tchu, in 33° 47′ N. lat., and 95° 54′ E. long. It flows in a narrow valley, at a height of 13,100 feet above the sea, and soon enters a narrow gorge between high mountains. The camels were in very bad condition, and there were no means of moving down the Dy-tchu, as it entered a narrow stony gorge. Neither was it possible to cross the rapid river, so that Prjevalsky was compelled to return. On the return journey the Expedition explored both the lakes of the Upper Hoang-ho, but it had to carry on regular fighting with several hundreds of Tangutes. It was thus obliged to abandon the exploration of the northern shores of the lakes, and to return to the store-house.

The attempt to reach Lhassa by this route thus proved a failure; and, in our opinion, a worse route could not have been chosen. True, while going due south from Dzun-zasak, Prjevalsky reached the lakes of the Upper Hoang-ho, and solved a great geographical problem; but then he had before him a mountainous region which he would have had to cross in an oblique direction—the series of ridges which accompany the great border-ridge of Eastern Tibet undoubtedly having a direction from the south-west to the north-east. Even if he had had horses, instead of camels, he would have met with insuperable difficulties. The fact is, that, having no knowledge of the orography of the highlands of Eastern Tibet, geographers draw on our maps the mountains of the Amdo as running *between* the problematic courses of the rivers which flow from Central Asia to Burmah and China; the ridges thus have on our maps a south-eastern direction, while in reality there is the greatest probability in favour of the mountain-ridges having a north-eastern direction, and being *pierced* by those rivers. The great border-ridges of the great Central Asian plateau, which are known under the name of Great Khingan in the north, cannot terminate in the latitude of 35°. Probably they continue south-west as far as the Himalayas, and so it is most likely that the region of the Upper Yang-tzse-Kiang is filled with mountains running from the south-west to the north-east.

This view is supported by the results of Prjevalsky's exploration. In 1880, when he took from Dzun-zasak a south-western direction, and thus followed the foot of the highlands, he reached the Khara-usu with comparative ease. But when he went southwards and reached the Dy-tchu under the 96th degree of longitude, he could move neither east nor south. In the east he saw the gorges by which the Dy-tchu, which flows south-east, pierces the first of the series of the mountains that accompany the border-ridge. And further south he saw before him the continuation of the same ridge, and obviously could not cross it in an oblique direction.

All this becomes obvious when one attentively examines the map which accompanies Prjevalsky's last work. In fact, we see on that map that the two great lines of upheavals—south-west to north-east, and north-west to south-east—which so distinctly appear in Turkestan, the Caucasus, and Siberia (the chains running south-west to north-east being more ancient than those which run in the other direction) are as well pronounced in the southern parts of the great Central Asian plateau as they are in its northern and eastern parts. The whole of Central Asia appears, in fact, as a series of plateaus of various heights, which—very much like Bohemia in Europe—are bordered by chains having a direction from either south-west to north-east, or north-west to south-east.[1]

Although the Expedition failed to reach Lhassa, its observations on the climate, flora, and fauna of Northern Tibet are invaluable. The climate of the region; its poor vegetation, which has every year only a few days for developing its flowers and seeds, and nevertheless is strikingly rich in the numbers of its species; the mixture of Chinese, Himalayan, Tibetan, and Central Asian species which one finds in these highlands,—all this renders the borderlands of Tibet in Prjevalsky's description almost more interesting than the plateau itself.

We shall only refer to that part of the journey during which the Expedition moved north-westwards from the Dzun-zasak store-house to the small lake Gas, at the foot of the ridges Tsaidam, Garynga, Torai, Columbus, and Marco Polo's, which connect the Altyn-tagh with the yet unnamed highlands of the Upper Hoang-ho. Most interesting facts as to the nature of Tsaidam will be found in the chapter devoted to that part of the journey. Prjevalsky's winter excursion from Lake Gas enabled him to obtain an insight into the structure of the border-ridges which separate Northern Tibet from the lower terrace of Tsaidam (9000 feet above the sea). No less than three parallel ridges constitute that border-region. The outer ones are known under the names of Tsaidam, Garynga, and Torai; but these are not the highest of the series. The highest summits are gathered in the next row of mountains—the Columbus, Marco Polo's, and Prjevalsky's ridges (this last name has been given to it by the Russian Geographical Society). Behind them there seems to be a third series of ridges, and then begins the plateau (also intersected by several snow-clad ridges), which is not less than 3000 feet higher than the Tsaidam plateau, and thus reaches about 12,000 feet in its lowest depressions. Much remains, however, to be explored before we can have a clear idea as to the structure of the mountains which separate Northern Tibet from the Lob-nor depression. Mr. Carey has already cleared up some points, and we may hope that this part of Central Asia—relatively easy to explore—will be well mapped before very long. Let us mention also that on the high plateaus which Prjevalsky visited from Lake Gas he discovered a new species of *Ovis*, which he named *Ovis dalai-lamæ;* it slightly differs by its horns and coloration from all known species of the same genus.

Less than 150 miles separate Lake Gas from the Lob-nor, and so the Expedition went to that lake, which was reached early in February 1885. There the Expedition stayed fifty days; and two chapters of the work which we have before us are given to the description of the Lower Tarim and the Lob-nor (which rapidly dries up and becomes a mere marsh), its flora, fauna, and inhabitants. Many photographs illustrate these chapters, so that now we have an accurate idea of the nature and inhabitants of the great depression which ten years ago was quite unknown. From Lob-nor the Expedition went south-westwards to Khotan, and thus followed the foot of the Altyn-tagh, the Toguz-daban, and the "Russian" ridge, which border the Northern Tibetan terrace on the north-west. The Turkestan oases of Tchertchen, Keria, Niya, and Khotan were thus visited, and again we find much valuable information as to the nature and inhabitants of the country in the chapters dealing with that part of the journey, as also excellent photographs of the inhabitants. Especially interesting are the photographs of the moving sands with their "ripple-marks" made by the wind, of the gigantic holy willows around a spring in the oasis of Niya, and of mulberry-trees in Yasulgun. It would be impossible to give in a few lines an adequate impression of the information gathered by Prjevalsky during his journey on a relatively beaten tract in Eastern Turkestan. To take one instance, we have hitherto had a general idea of the oasis of Keria and the high border-ridge which separates it in the south from the high plateaus. Although Prjevalsky made only a short excursion in these highlands, he supplies us with a most vivid description of the ridge (nearly 20,000 feet high) and its outer spurs, its flora and fauna, its inhabitants—the mountaineer Matchins who dig their dwellings in the loess which fringes the highlands (a group of such dwellings is represented by a photograph)—and their manners and customs. One feature of the highlands of Keria is especially worthy of note—the great amount of rain which falls on them in June and July. During the twenty-five days (July 10 to August 5) which Prjevalsky spent on the outspurs of the Keria Mountains, at a height of from 12,000 to 13,000 feet, it rained and snowed nearly all the time; the clouds coming from Tibet being condensed as they reached the high Keria ridge. The water which falls on the loess soil is immediately evaporated and re-condensed by the cold air of the snow-clad summits. The great amount of rain in the border-ridges is the more striking as in East Turkestan rain is exceedingly scarce, and there is but very little rain at a level below 6000 feet. Prjevalsky concludes that the heavy summer rains which fall in the Keria Mountains every year are due to the south-western winds coming from the Indian Ocean, and he maintains that the effects of the monsoon winds are felt even in the upper parts of the Hoang-ho.

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[1] See Mushketoff's "Turkestan"; also the articles "Siberia," "Turkestan," "Transcaspian," "Transcaucasia," and "Ural," in the "Encyclopædia Britannica," and "Asia" in "Chambers' Encyclopædia."

From Khotan the Expedition went northwards, across the desert. It crossed the Tarim at the confluence of the Yarkand-daria and the Aksu-daria, at a height of 3100 feet above the sea. The river has there a width of 185 yards, and an average depth of from 3 to 4 feet at low water. The velocity of the current was 160 feet in a minute. From these facts, as well as from what he saw of the Lower Tarim, Prjevalsky concludes that the river can be navigated by small steamers from Lob-nor up to the confluence of the Yarkand and Aksu Rivers, and that the two latter can also be navigated to some extent.

The last chapter of the work is devoted to a general sketch of the political condition of Central Asia; but those who are acquainted with the recent literature of the subject will find little new in it. Geographers who may propose to explore Central Asia will find more to interest them in the introductory chapter devoted to the ways and means of travelling in Central Asia, with minute instructions as to how to organize expeditions. This chapter is full of practical hints. As to the scientific problems, Prjevalsky remarks that the present period of great discoveries in Central Asia is rapidly coming to an end. Few parts of what was formerly the great *terra incognita* remain to be explored; so that we approach a time when regular scientific expeditions will be necessary. There remain for investigation by means of "scientific reconnoitrings" the plateaus of Northern Tibet, the highlands of Eastern Tibet and Amdo, and Southern Tibet from Lhassa to Gartok. Three expeditions, lasting two or three years each, would suffice for the exploration of these three regions. The Pamir, with the Hindu-Kush and the Karakorum Mountains, the Eastern Tian-shan, the Altyn-tagh and the Nian-shan, the border-ridges of South-East Mongolia, the whole of the great Khingan, and North-Western Mongolia, close to the Siberian frontier, come next. Dealing with the subject of special scientific explorations, he recommends the Karashar and Si-nin for zoologists; the Tchertchen oasis for archæologists; Si-nin for ethnographers; Kashgar and Khotan, and Si-nin and Urga, for meteorologists; and the whole of Central Asia for geologists.

The present volume has three maps. One of them, on the scale of 67 miles to the inch, embodies the results of the four journeys of Prjevalsky, and is an excellent map of the eastern parts of Central Asia. Two maps, on the scale of 33 miles to the inch, embody the original surveys of the Expedition at the sources of the Yellow River and in East Turkestan. Numbers of excellent photo-lithographs, and three drawings representing new species of *Antelope* and *Ovis*, are inserted in the work.

Many years will elapse before the complete descriptions of Prjevalsky's rich collections will be published. All that can now be said is that they are in excellent hands. K. I. Maximowicz, A. A. Strauch, S. M. Hertzenstein E. A. Büchner, A. S. Woeikoff, and A. A. Inostrantseff are busily occupied with them, and the first parts of their common work are already in print. The first instalment of the first volume, containing the "Mammals," by E. Büchner, was issued at St. Petersburg a few days ago.

P. K.

FLOWERING PLANTS OF WILTS.

Flowering Plants of Wilts; with Sketches of the Physical Geography and Climate of the County. By the Rev. T. A. Preston, M.A. 500 pp. With a Map. (Published by the Wiltshire Archæological and Natural History Society, 1888.).

IN Wiltshire, the chalk downs which form so characteristic a feature of the geology and physical geography of the South of England reach their western limits. The area of the county is about 1300 square miles. It does not anywhere reach the coast, and forms a watershed from which small streams run in three directions, to the Severn, Thames, and English Channel. An elevated plateau of chalk on the south-east occupies more than half the area of the county. This is divided into two unequal halves by a natural depression, called the Vale of Pewsey, which runs almost due east and west, from Devizes to Hungerford. Along this hollow runs the Kennet and Avon Canal, of which the highest point, near Savernake, reaches an altitude of 500 feet. The northern portion of this chalk plateau is called Marlborough Downs, and the town of Marlborough stands nearly in the centre of it. The southern part is Salisbury Plain, the word plain as here applied conveying a delusive notion. Salisbury is at the south, and Stonehenge near the centre of this southern chalk tract. The highest points of these chalk downs reach a height of from 800 to 950 feet. The third section of the county, lying west and north of the chalk, is the fertile plain, underlain by greensand and oolite, along which the Great Western Railway runs between Swindon and Bath. The following extract from the introductory essay contributed to this flora by the Rev. J. Sowerby gives, in a few words, an excellent idea of the general characteristics of these different districts:—

"The great characteristic of the chalk plateau is its vast extent of grass-land, where sheep are extensively pastured. This space is more broken up each year for cultivation, but often exhibits great tracts of grass, with only occasional patches of furze. Only on the small patches of Tertiary scattered here and there, especially in the northern part, do we find wood (generally only underwood), excepting the grand forest of Savernake, twenty square miles in area, which can show timber of an age and size unrivalled in any part of England. The upper chalk hills were once, it is probable, covered with extensive copses, chiefly thorns. Remains of these still occur here and there; and individual trees of great size, some yet extant, others only traditional or historical, attest the former existence of a primæval wood. In the hollows of the downs, especially near the villages, there are spaces, often finely timbered, especially with elms. Monotonous as the surface of the downs may seem to be, the changes that present themselves are often singularly picturesque and varied. After passing, it may be for hours, over the gently sloping grass plains, all blue above, all green below, the traveller suddenly sees below him a